Shaban International Development Co. Ltd

(Oil & Gas Fields Services)

شركة شعبان العالمية للتنمية المحدودة

(خدمات حقول النفط والغاز)

About US

Our Company is a Saudi international company working in **Oil Field Services and Supplying**; the company is operated with professional staff of petroleum engineer, mechanical engineer and technicians, with a technical support of international manufactures. The headquarter in Al Khobar, KSA.

Our Vision

Our Company International intends to be the leading oil fields services provider in the middle east with the highest professional and international standards- as measured by the quality of services provided, customer satisfaction, profitability and maintenance of a work force of the highest caliber.

Our Mission

- Our business is to provide safe, quality services in all that we offer to the energy industry.
- Provide the highest levels of product and services quality in the oil and gas service sector.
- Provide a challenging, rewarding and learning environment for the whole team.
- Meet and strive to exceed all the safety and environmental standards established in the industry.
- Embrace change and challenges to maintain a profitable business that customers and employees alike are proud to be associated with maintain a culture of excellence in all that we do.

Our Values

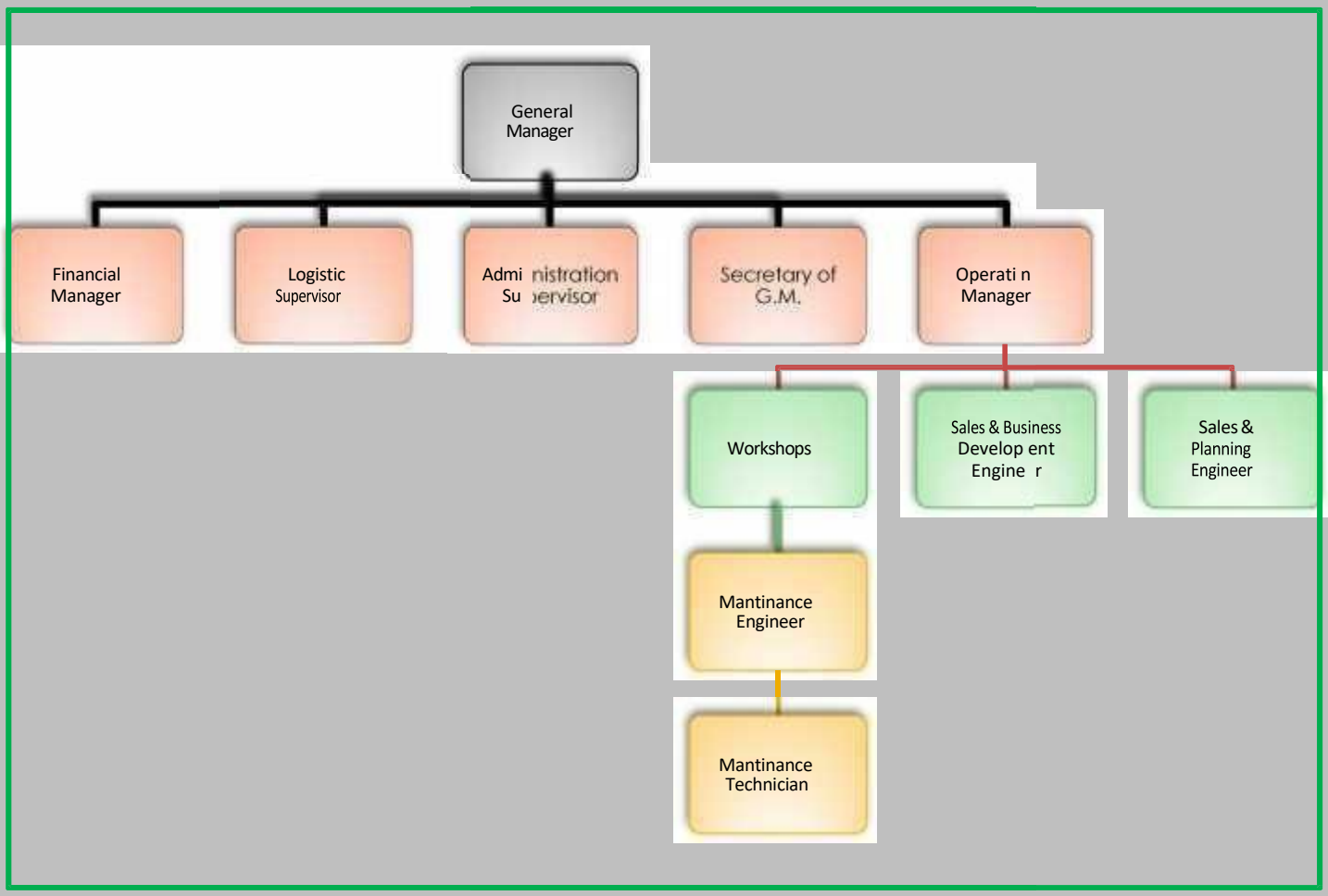
- We value our people, participants, shareholders, Customers, suppliers, community and the environment. We are committed to continuously improving our company and will Work as a single integrated team generate a spirit of mutual support. Foster. Be innovative and continuously improve. Trust and empower each other, encourage initiative and assume responsibility. Reward, recognize and acknowledge the accomplishments of others. Treat all people fairly and with mutual respect. Openly communicate and share Information Company – wide and be transparent with our customers and suppliers. Maintain high standards of safety, health and environmental practices. Conduct our business in an ethical manner.

Activities

Beside our technical team for the service we have another teems of administration business development, Marketing and QHSE. Our professional technical staff are following the new projects with clients, designing our engineering projects and controlling the work flow in the field, we do all of our activities as per our QHSE standard and polices.

Our Company is working in materials supplying as another activity for the company beside our main services. We have a special section for that as supplying department. All of our materials inspected by a professional team before shipping to the end user.

Organization Chart:



Our Services

- Down Hole Tools (Drilling Jars, Stabilizers and Shock tool).
- Drilling Mud Motors & MWD
- Inspection Services.
- EOR and IOR
- Man Power Services.
- Corrosion solutions
- Well Drilling perforator
- RTH Prediction Technology.
- Drilling of Water Wells

Our Supplying

- Well head Equipment & Accessories.
- PDC and Rock Drilling Bits
- ESP pumps
- Cement & Casing Accessories.
- Production Chemicals
- Catalytic Solutions

QHSE

The aim of Our Company is not only to satisfy, but also to exceed the expectation of our clients and our employees by providing a quality service. Ultimate aims of QHSE are following:

1. Provide a management system that is integrated and one that complies with applicable ISO and OHSAS requirements thus leading to continual improvement in all areas of the services we provide.
2. To train and develop our personnel to the highest standard for the delivery of a first class service to our clients while demonstrating our commitment to QHSE requirements and expectations.
3. To ensure careful use of material resources to reduce waste to a minimum and minimize pollution.
4. To provide a safe and healthy working environment for all our people wherever they are working.

Our Company will achieve these aims through: review and continuous improvement of our Management System, Strong Internal Communication. Professional Supervision

Services

1. DOWNHOLE TOOLS

Drilling Jars

Overview

The DJ6 Drilling Jar is one of the toughest and most durable jars in the oil industry. Designed and operated in and for a wide range of applications, this jar is ideal for directional, horizontal and deep hole applications both on and off shore. With its reliable, state-of-the-art design, the DJ6 Drilling Jar is a proven performer worldwide.

Features

- Jar can be operated in both directions.
- Not affected by torque, no safety clamp required.
- Mechanical latch will eliminate premature firing of the tool. The jars will not fire unexpectedly while tripping or making connections.
- Hydraulic delay is not affected by hole temperature or by long-term jarring.
- Standard operating temperatures up to 250°F (121°C). Special seals are available for operating temperatures up to 450°F (232°C).

Available range: 9 1/2" to 3-1/2". (Other sizes available on request)

Stabilizers:

Overview

Designed and Built to Perform

The stabilizers, reamers and keyseat wipers are consistently constructed to exacting standards. To start, we use only 4145H heat-treated, stress-relieved steel, every bar of

which is tested by independent metallurgical laboratories to verify its quality. We then dedicate a single piece of steel for each stabilizer, reamer and keyseat wiper that we mill. All connections are machined to API specification, with bore back, stress-relief and phosphated.

Designed for Better Performance

- Increased penetration
- Fewer problems
- Straighter hole
- Improved fluid passage

Available range: 26" to 4-3/4". (Other sizes available on request)

SHOCK TOOLS:

Overview

The Shock Tool is designed for a wide range of drilling conditions. Deep, hot and

deviated wells can all be drilled efficiently – from spud to T.D.

- Increased bit life
- Increased penetration rate, by ensuring optimum bit weight and RPM
- Minimizationofhole deviation by dampening transient loads and controlling net forces at the bit
- Lengthened drill string component life by reducing cyclic loading
- Reduced rig floor maintenance costs by reducing vibrations at the surface

Features

The Shock Tool unique Belleville Spring arrangement allows for spring rates tailored to specific applications. The shock tool is supplied with a standard spring configuration to ensure optimum performance with typical tool placement, and drill bit configurations. It can be supplied with a spring arrangement specifically tailored to PDC bit usage. A PDC bit spring configuration is a special arrangement of the Belleville Spring at the time of tool service but can be supplied in any size of DS shock tools.

Available range : 2" to 4 3/4". (Other sizes available on request)

2. Motors and MWD

Over View

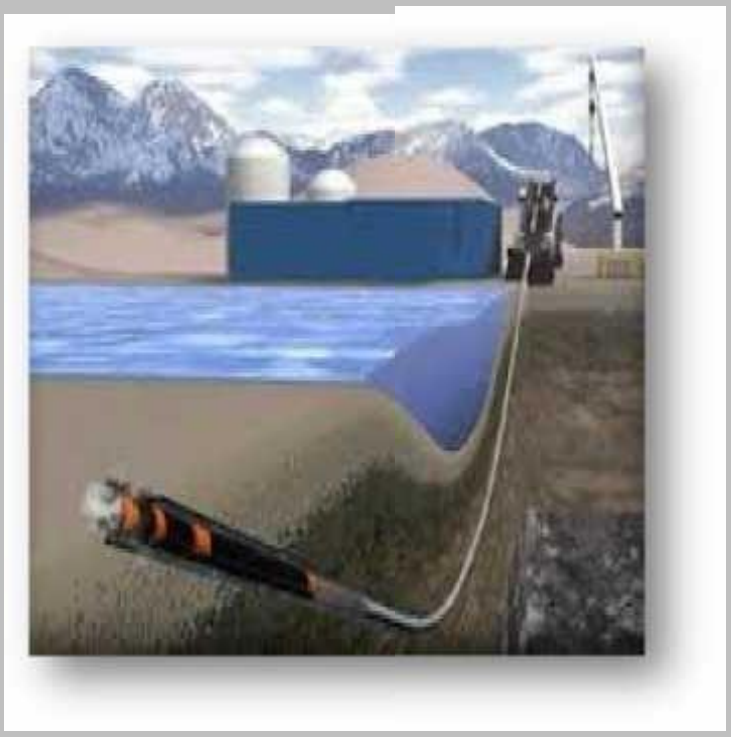
Our diverse range of Motors expertise is paramount to the success of our project. Regional experience coupled with our vast array of in-house Navigation Systems allows Our Company to provide "fit for purpose" custom directional service packages for the most challenging projects.

Our tools and sensors are designed for outstanding performance under severe drilling conditions including extreme temperature, pressure, well depth, dogleg severity, drilling shock and vibrations.

Our Company is positioned to provide an unsurpassed package of customized services to fit your project anywhere in the world.

OUR FOCUS!

- Strong leadership and vision
- High degree of discipline and integrity
- Performance



OPERATION

WELL PLANNING

- Directional Well Planning
- Positional Uncertainty
- Anti-collision Analysis
- 3D Visualization
- Field Data Management
- Plotting and Reporting

MWD Systems

- Meets or exceeds API standards
- Various systems to meet customer needs and applications.
- Specialty kits upon request
- Multiple battery applications for improved tool life
- Pulsar and EM options available

TECHNOLOGY & PRODUCTS

- Short Bit-to-Bend 48"
- Mud Motors (up to 70˚/30m DLS & 11 ¾" to 3 ⅛" OD)
- Hard Rubber - high performance
- 50% more torque and power
- Durability in difficult drilling environments
- Drilling Jars
- Shock Tools
- Mechanical Thrusters

Features

The Drilling Motor provides a more accurate and durable drive system. It was designed with a large bore, which is maintained throughout the motor to minimize pressure drop across the motor and maximize available hydraulic power.

All parts of the bearing assembly have been designed to eliminate fatigue mechanisms by including large stress-relief radii manufactured from strong alloy steels. Our Cougar DS Drilling Motor bearing assembly is designed

to run not only with low torque/high speed power sections, but with the highest torque output power sections available on the market today.

Available range : 11 1/4" to 3 1/8". (Other sizes available on request)

3.Inspection services:

Inspection services are as following:

NDT(Non Destructive Testing):

1. Tubular Inspection.
2. Drill Pipe.
3. Heavy Weight Drill Pipe.
4. Drill Collars.
5. Casing.
6. Tubing.
7. Bottom Hole Assembly components.
8. Lifting equipment Insp.
10. Pipe Maintenance Services.

- Internal cleaning.
- OD Sand Blasting.

11. Straightening.
12. Re-facing of Tool Joints.
13. Handling and storage of Tubular.

NDT (Non Destructive Testing) Methods:

•Visual Pipe Inspection.
•Dimensional Inspection of Pipe. •Ultrasonic (UT) wall thickness inspection.
- Ultrasonic shear wave (UT)
- Inspection of upsets and end areas.
• EMI Transverse Inspection by conventional Spectrograph h2000.
•EMI 2 Inspection by Techscope EZW-II (Two function DP unit to cover DS.1 & NS2 requirements.
•Visual Thread Inspection.
•Dimensional Inspection of Rotary Shouldered connections.
•Magnetic Particle Inspection (MPI) of Pipe Body and Upsets.
Wet Fluorescent Magnetic Particle (black light) Inspection.
•Tool Joint Dimensional Inspection.
• Dye Penetrant Testing.
•API Full Length Drifting.
•Hardness Testing.
•API Thread Gauging.

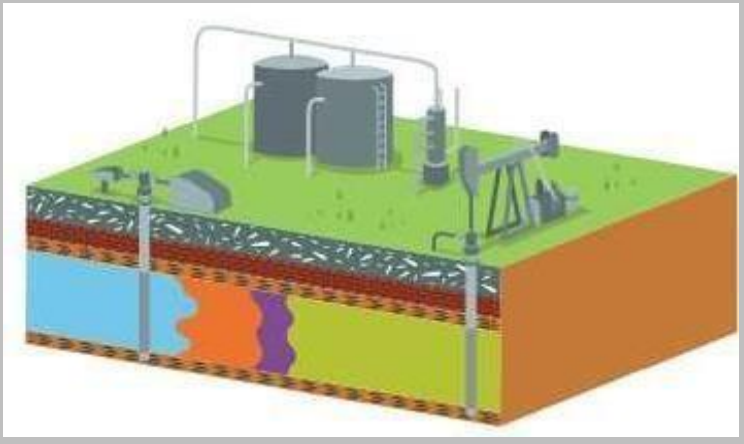
4. EOR Services

Responding to an ever-increasing demand and High Oil residual in Sudanese fields. Our Company analytical and consulting solutions for Enhanced Oil Recovery (EOR) enable you to optimize the extraction of your oil beyond that recoverable by primary and secondary methods.

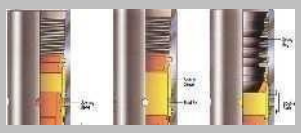
We have expert knowledge in sophisticated, multi-disciplinary EOR studies and through our consultation services we are able to give you a comprehensive understanding of your reservoir and advise on the best methodology, adapting it to the specific conditions of your reservoir. With the expertise we provide and the guidance we offer you can reduce the risks and uncertainties when undertaking pilot and full field EOR project designs. You can depend on Our Company for the highest level of experience, reliable analytical results and engineering consulting services for all your EOR projects

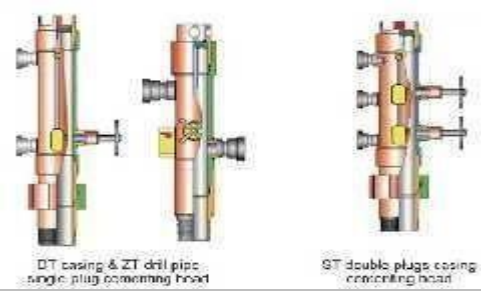
We use advanced testing and engineering combining laboratory data and field studies to develop a comprehensive analysis of your EOR operations. Our analyses enable us to streamline your EOR program and optimize your recoveries. Our services include screening, defining, evaluating and planning for EOR projects over a broad range of EOR techniques:

- **Chemical EOR**
- **Thermal EOR**
- **Gas injection**
- **Gas recycling**



2.Cementing & Casing Accessories:

1- Stage Collars & Accessories: 	**1.1 Model YFZ-A Mechanical Stage Collar:** **Features:** 1. Anti-rotation mechanism protects the closing sleeve from damage while drilling out the opening and closing seats.
	2. No fluid trapping while opening and closing the ports. 3. All internal parts are made of easily drillable material. 4. A Pump-Down Opening Plug can be used for a continuous two-stage cementing operation.
	1.2 Model CFZ-A Hydraulic Stage Collar Features: 1. The circulation ports can be hydraulically opened, eliminating the need to use a free-fall opening plug. Therefore, it is not restricted to well inclination. 2. Internal closing structure and anti-rotation mechanism protect the closing sleeve from damage while drilling out the opening and closing seats. 3. All internal parts are made of easily drillable material. Opening pressure adjustable upon customer request.
	1.3 Model YFZ-C Mechanical Drill-out Free Stage Collar **Features** 1. The circulation ports are mechanically opened by free-fall opening plug. 2. After circulation ports are closed, keep building up pressure will enable the sliding sleeves and other accessories to free fall to bottom, eliminating drill-out. 3. The stage collar is designed with internal closing structure. The closing sleeve is designed with hold down mechanism. Applicable well inclination: ≤25° .
	1.4 Model CFZ-C Hydraulic Drill-out Free Stage Collar **Features** 1. The circulation ports can be hydraulically opened, eliminating the need to use a free-fall opening plug. Therefore, it is not restricted to well inclination. After circulation ports are closed, keep building up pressure will enable the sliding sleeves and other accessories to free fall to bottom, eliminating drill-

	out.
	Features 1.All accessories are made of easily drillable rubber and aluminum alloy. 2. The free-fall opening plug is filled with weighted material to reduce free-fall time. The first-stage wiper plug is used for bumping during the first stage cementation
2-Cementing Heads  	**3.1 Model DS Single Plug Cementing Head Features** 1. Quick installation casing adapter allows convenient installation of cementing head. 2. Plug release indicator provides visual indication for plug pass. 3. Large plug container ID allows easy release of plug retain pin.
	Model ST Double Plug Cementing Head Features 1. Capable of holding two plugs simultaneously. Used for cementing with top and bottom plugs, or for continuous two stage cementing. 2. Quick installation casing adapter allows convenient installation of cementing head. 3. Plug release indicator provides visual indication for plug pass. Large plug container ID allows easy release of plug retain pin.
	Model ZT Drill Pipe Cementing Head Features 1. Large plug container ID allows easy release of plug retain pin. Designed with a lifting sub to lift the cementing head and pipe string with elevators.
	Model ZT-DR Top Drive Cementing Head Features 1. Can be connected with a top drive to rotate the liner. 2. Designed with bypass circulation channel to allow circulation with top drive when a pump down plug is pre-loaded. 3. Heavy duty bearing allows safe rotation during pipe reciprocation and cementation. The cementing head has reliable sealing capacity and can hold high pressure even in rotation status.
	Model ZT-R Rotating Cementing Head Features

	1. Heavy duty bearing allows safe rotation during pipe reciprocation and cementation. 2. The cementing head has reliable sealing capacity and can hold high pressure even in rotating status. The cementing head may be lifted when the drill string is rotated by rotary table. It can rotate freely even under tension.
3-Float Equipment 	**Model FG-H Float Collar** **Features** 1. The valve is made with phenolic material and molded with high strength concrete. Both the valve and concrete are easily drillable. 2. Excellent performance for flow endurance and back pressure holding. Single valve and double valve versions are available.
	Model FX-HE Float Shoe **Features** 1. Rounded nose profile helps guide the casing string. 2. The valve is made with phenolic material and molded with high strength concrete. Both the valve and concrete are easily drillable. 3. Excellent performance for flow endurance and back pressure holding. 4. Single valve and double valve versions are available.
	Model FX-D Auto-fill Float Shoe Features 1. Allows auto-fill during casing running and saves rig time. 2. Excellent performance for flow endurance and back pressure holding. PDC drillable.
	Model FX-H Liner Float Shoe Features 1. Designed with side ports and bottom blades for liner job. 2. The valve is made with phenolic material and molded with high strength concrete. Both the valve and concrete are easily drillable. 3. Excellent performance for flow endurance and back pressure holding. Single valve and double valve versions are available.
	Stab-in Float Collar/ Shoe

	Features 1. Used for the inner string cementing of large diameter casing. 2. Displacement volume and cementation time are reduced. 3. The valve is made with phenolic material and molded with high strength concrete. Both the valve and concrete are easily drillable. 4. Excellent performance for flow endurance and back pressure holding. Single valve and double valve versions are available.
	Model FG-HF Non-rotating Float Collar Features 1. Designed to bump non-rotating cementing plugs and reduce plug drill-out time. 2. The valve is made with phenolic material and molded with high strength concrete. Both the valve and concrete are easily drillable. 3. Excellent performance for flow endurance and back pressure holding.
	Cementing plugs **Features** 1. Separate cement slurry from drilling fluid and prevent contamination. 2. Both plastic core and rubber fins are easily drillable. 3. Available in two types: conventional and non-rotating. Non-rotating design reduces drill-out time.
	**Model DCT-B Non-welded Casing Centralizer Features** 1. Non-welded, pressed by punching, high strength. 2. Starting force and restoring force exceed API 10D specifications. 3. Hinged design allows convenient field installation. 4. Can be unfolded and stacked flatly, saving storage and transportation cost. 5. Improves displacement efficiency when installed with turbo blades.
	Model DCT-S Double Bow Centralizer Features 1. Non-welded, pressed by punching, high strength. 2. Compared with single bow centralizer, the restoring force is higher while the starting force and

	running force are lower. Therefore, it can be run in vertical, highly-deviated and horizontal wells. 3. Hinged design allows convenient field installation. 4. Can be unfolded and stacked flatly, saving storage and transportation cost.
	Model GFZ-F Positive Centralizer Features 1. Used for cased hole. 2. Larger flow area than conventional rigid centralizer. 3. Non-welded, pressed by punching, high strength. 4. Hinged design allows convenient field installation. 5 .Can be unfolded and stacked flatly, saving storage and transportation cost.
	Welded Bow Spring Centralizer Features 1. Welded by automatic welding machine, the centralizer has uniform welds and reliable strength. 2. Starting force and restoring force exceed API 10D specifications. 3. Hinged design allows convenient field installation. 4. Can be unfolded and stacked flatly, saving storage and transportation cost. 5. Slip-on welded bow spring centralizer is available for slim hole.
	Model GFZ-H Welded Spiral Centralizer Features 1. Special blade profile allows easy gliding in wellbore. 2. Low drag force and rotation torque. 3. Can be run in vertical, highly-deviated and horizontal wells. Available with straight or spiral blades.
	Model GFZ-E Zinc Alloy Centralizer Features 1. Protects casing from electrochemical corrosion. 2. Lower coefficient of fraction than steel and aluminum centralizers, providing easier casing running and rotation. Can be run in vertical, highly-deviated and horizontal wells.
	Model GFZ-D Polymer Centralizer Features

	1. Strong wear resistance. 2. Low coefficient of fraction, providing easier casing running and rotation. Can be run in vertical, highly-deviated and horizontal wells.
	Solid Body Centralizer Features 1. Available with straight or spiral blades. 2. May be casted with steel or aluminum. Can be run in vertical, highly-deviated and horizontal wells
5- Stop Collar 	**Hinged Stop Collar, with Bolt and Nut Features** 1. A bolt/nut assembly is tightened to grip the stop collar around the circumference of casing pipe. Hinged design allows convenient installation.
	Slip-on Stop Collar, with Set Screws Features 1. One piece, high strength. Fixed by Allen screws to provide superior holding force.

3- Well Head Assembly and Christmas tree:

Our company can provide the well control & wellhead equipment used for land and offshore oil exploration and development, such as wellhead equipment, Christmas tree, BOP and manifold, etc.

1.Christmas tree:

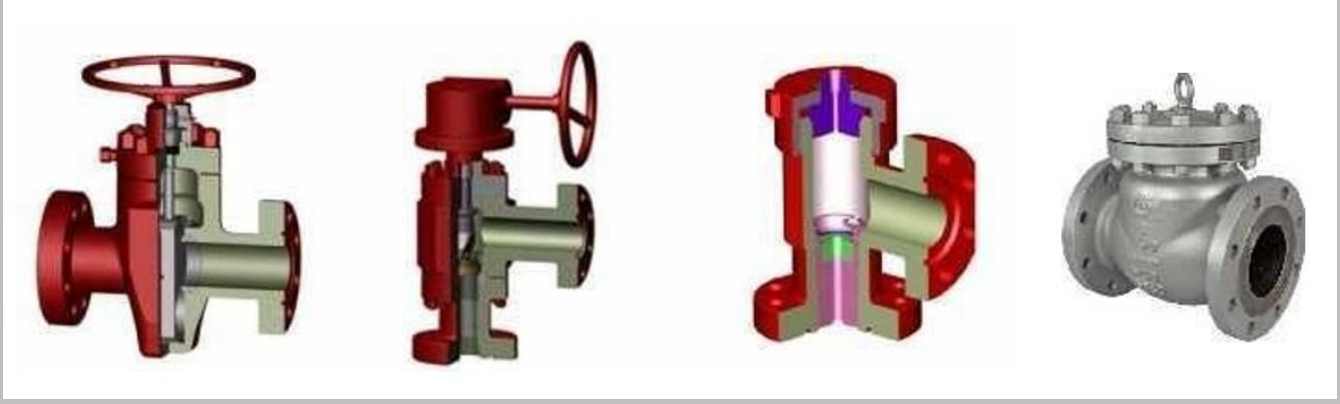
The Christmas tree is used for controlling the wellhead pressure and adjusting the output of the oil and gas well, and also can be used for the special operations. the Christmas tree can meet different working conditions

Basic Parameters:

- Working Pressure: 2.000 Psi -20.000 psi
- Nominal Diameter: 2 1/16" -4 1/16"
- Working temperature:60 c -121 c

2.Valves

- PFFA series slab gate valve.
- PFF series slab valve
- Orifice plate choke valve
- Adjustable choke valve
- Fixed choke valve
- Check valve

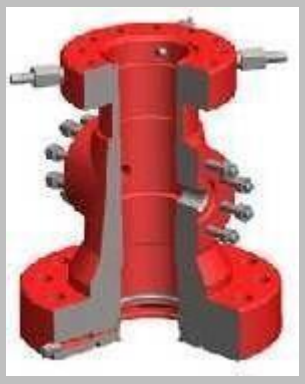


3.Tubing (Casing) Head

Tubing head and casing head can be installed with a series standard of slip type and mandrel type suspenders. And they device produced can meet sealing and supporting requirements between casing hanger and casing oil (gas) well.

Basic Parameters:

- Working Pressure: 2.000 Psi -15.000 psi
- Working temperature:60 c -121 c
- Material grade: AA, BB, CC, DD, EE, FF, HH



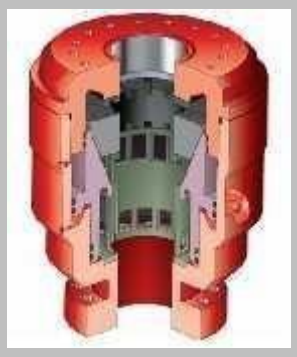
4. Casing Hanger

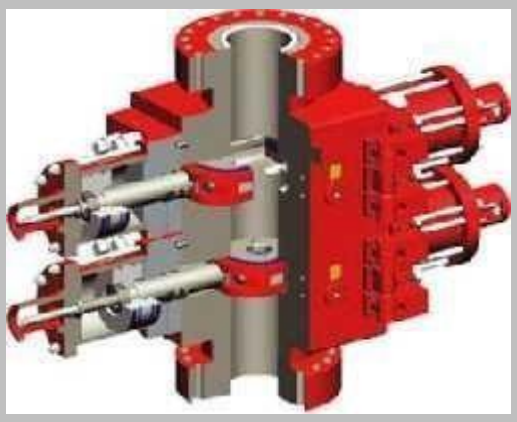
Basic Parameters:

- Working temperature:60 c -121 c
- Test pressure: take 80% of the casing collapse resistance or working pressure.
- Application places: be suitable for all kinds of casing

1.
2. RAM BOP

5. BOP





6. Choke /Kill Manifold

Used for control of overflow and blowout of oil and gas well, the choke manifold controls the casing pressure and protecting the wellhead. Kill manifold implements well killing operation through pumping killing liquid into the well.

Basic Parameters:

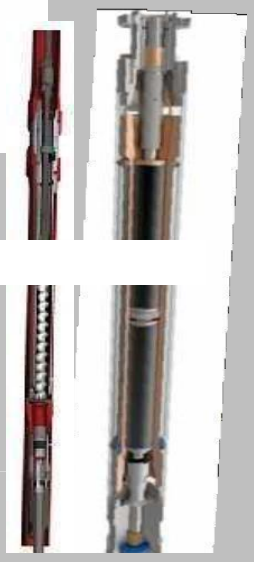
- Working Pressure: 2.000 Psi -15.000 psi
- Nominal Diameter: 2 1/16" -4 1/16"
- Working temperature:29 c -121 c

4.Drilling Bits:

Our Company provides industry-leading, high-efficiency fixed cutter, roller cone and PDC drill bit solutions for reliable performance in a wide range of drilling environments.

Main Types of drill bits:

1. Tri-cone roller drill bits.
2. Steel milled tooth bits.
3. PDC drill bits.



All Types & Sizes Available On Request

5.Production Pumps:

OUR COMPANY offers three lifting Tools which are following:

1. electrical submersible pumps (ESPs),
2. progressive cavity pumps (PCPs), and
3. Surface rod pumps (SRPs).

Our Company also provides the associated surface packages for power, control and monitoring of the entire lift system. We also provide installation, maintenance, repair and testing services for each. The method selected is designed and operated to address individual customer production requirements and achieve a superior level of product performance and reliability, while adhering to the highest standards of health and safety and operating in a manner that is respectful to the environment. Strategically located to serve the worldwide oil and gas industry, we strive to develop long-term customer relationships that maximize production, enhance operating efficiency and meet return on investment goals.

All Pumps Types & Sizes are Available on Request

Well drilling perforator PS-112.70.M

PURPOSE

Well drilling perforator PS-112.70.M is designed for creating perforation channels in cased wells with an internal diameter of 140-168 mm (inches).

ADVANTAGES OF TECHNOLOGY

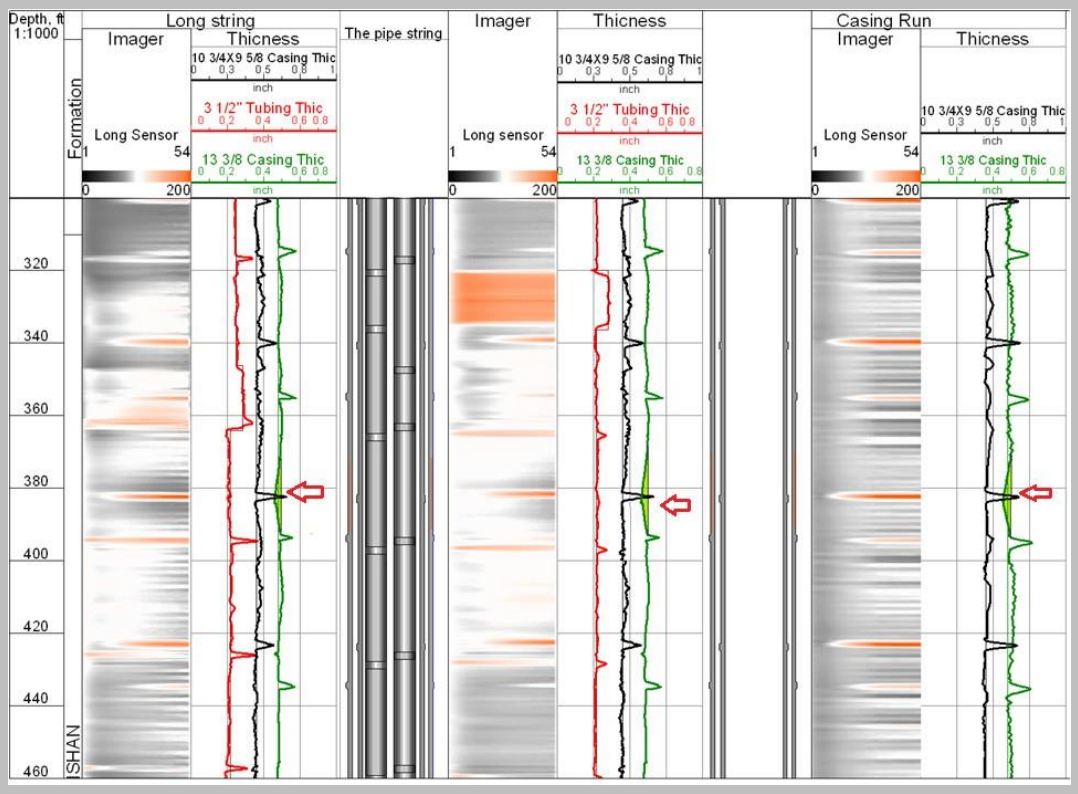
- the use of Well drilling perforator PS-112.70.M allows perforation of productive formations of small thickness (up to 15 meters / 49.2 feet) and in the presence of aquifers and productive horizons (from 1.5-3 meters / 4.9-9.8 feet to 49.2-65.6 feet), under such conditions the period of water-free operation of wells increases by 3-5 times;
- in the case when the pressure in the reservoir does not exceed the hydrostatic pressure in the wellbore (when using Well drilling perforator PS- 112.70.M), the inflow is caused at depressions 50-70% smaller than when using cumulative (explosive) perforation;
- when using Well drilling perforator PS-112.70.M, the insulating capacity of the cement ring is preserved, since it is not subject to destructive effects as in cumulative (explosive) perforation, which in turn allows for a multiple increase in the well operating period without repair;
- Well drilling perforator PS-112.70.M increases the well operating time until the next major well repair;
- Well drilling perforator PS-112.70.M allows for formation perforation without impact on the well mount elements;
- Well drilling perforator PS-112.70.M ensures obtaining holes with a diameter of 15 millimeters with a clean edge are produced;
- Well drilling perforator PS-112.70.M enables selective opening of formations consisting of alternating permeable and compacted rocks;
- Well drilling perforator PS-112.70 allows creating holes during repair work in the well walls in a multi-column structure for pouring cement into the inter-tube (hole annulus) space;

TECHNICAL SPECIFICATIONS

Characteristic	Unit of measurement	Value
Power consumption, no more than	*Kilo Watt*	*2*
Voltage	*Volt*	*380*
Frequency of electric current	*Hertz*	*50*
Maximum well depth	*Meter/Feet*	*3500/11482*
Diameter of perforation hole	*Millimeter /Inch*	*15/0,59*
Length of perforation hole	*Millimeter/Inch*	*70/2,75*
Drilling time for one perforation hole, no more than	*Minutes*	*3*
Number of perforation holes drilled per run in a carbonate reservoir	*Pieces*	*15-30*
Number of perforation holes drilled per run in a terrigenous reservoir	*Pieces*	*5-10*
Working tool	*Carbide drill*	
Length of the well drilling perforator PS-112.70.M	*Millimeter/Inch*	*2400/94,48*
Diameter of the well drilling perforator PS-112.70.M	*Millimeter/Inch*	*112/4,04*
Weight of the well drilling perforator PS-112.70.M	*Kilogram*	*85*

Advanced Wireline Defectoscope Technology

Slim Defect scope MID-K



Why use MED-4G Defectoscope?

- Cost effective (reliable, monocable, slim and light version)
- Instantaneous and informative results (downhole processing ?)
- Certified equipment and calibrated measurements
- Very accurate depth control (GR)
- Small measurement errors

  - 0.01” for a single barrier case.
  - 0.03” for a dual barrier case.
  - 0.08” for a triple barrier case.
  - 0.14” for a quadruple barrier case.

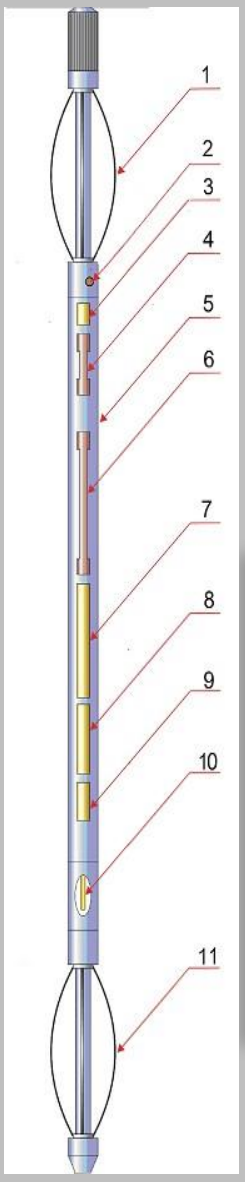
- Measures a wide range of casing and tubing diameters

MED-4G Applications

- Control of casing string, production casing and tubing technical conditions.
- Determination of casings and tubing thickness simultaneously.
- Detection of casings/tubing defects such as cracks, corrosion, perforating holes.
- Determination of casing collars positions in primary and secondary casing strings; casing shoes, packers, centralizers.
- Equipped with GR and Thermometer.

- Operates on a monocable providing cost effective

MED-4G Equipment



MIED-4G Specifications	Metric Units	Imperial Units
Length	2.6 m	8.5 ft
Diameter	42mm	1.65 inch
Pressure	120 MPa	1200 bar
Temperature	150°C	300°F
Weight	9 kg	20 lb
Logging Speed	200m/hour	**11ft/min**

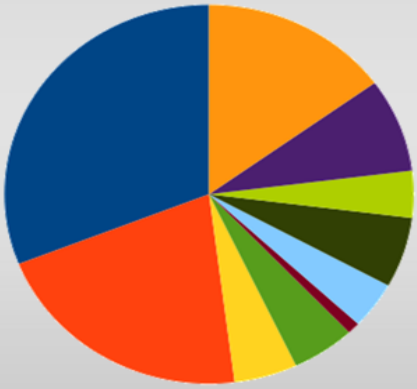
1	upper centralizer
2	pressure sensor
3	GR-module
4	electronics block
5	protective case
6	electronics block
7	long probe
8	Middle probe
9	short probe
10	thermometer sensor
11	lower centralizer

Technical Specification

MID-4G	
Pressure rating	120 MPa
Temperature rating	150℃
H2S	25 %
Maximum wall thickness of single barrier	(1in)
Maximum total wall thickness of 4 barrier	(2in)
Barrier thickness accuracy	
Single barrier case	±0.01 in (±0.25 mm)
Second barrier case	±0.03 in (±0.75 mm)
Third barrier case	±0.08 in (±2.00 mm)
Fourth barrier case	±0.14 in (±3.50 mm)
Minimum Vertical Fault detected	
Single barrier	OD*π/8
Second barrier	OD*π/5
Third barrier	OD*π/3
Fourth barrier	OD*π/2
Pipe OD range	2 - 20 in
External temperature sensor	
Temperature range	0-150 (175*) ℃
Resolution	(0.01 ℃)
Maximum continuous recording time	24 hrs
Recommended logging speed	6-18 ft/min (2-6 m/min)
OD	1 11/16 in (42 mm)
Length	(3 m)
Weight	9kg

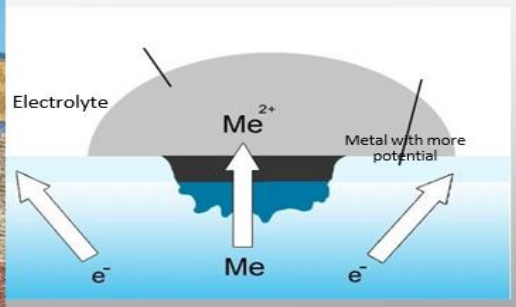
Measurements Validation

Causes of premature failures of Electric Submersible Pumps in Russia



- Mechanical impurities 31%
- Leakage of lift 5%
- High formation temperature 1%
- Due to wellwork 6%
- Equipment fault 8%
- Scaling 21%
- Well design 5%
- Due to failure of the ESP 4%
- Due to the manufacturer 4%
- Poor fluid influx 15%

Mechanism of corrosive wear



Result of electrochemical corrosion

Electric submersible pump

TUBING

CABLE

SUBMERSIBLE MOTOR

Galvanic protection

Anticorrosion module (AKM) is galvanic protection developed by our company based on many years of experience. The team of our company comprises former lead specialists who come from Geophysics Research Institute and have many years of experience in this field.

Corrosion damage of borehole equipment is a serious problem and huge financial losses for the oil and gas industry. Annual global financial losses are estimated at $2.2 trillion and those in our country are at $6.7 billion by estimate in 2015, while a quarter of those losses can be avoided using science-based corrosion protection methods.

We offer a technical solution based on the same time-tested and well-proven physical and chemical properties of non-ferrous metals.

The product Anti-corrosion module - AKM is designed to improve the efficiency of oil production in difficult conditions and combat corrosion in the tubing string (tubing) / production pipes, the casing string of an oil and gas well and downhole pumping equipment (DPE) of oil and gas wells, as there is a struggle with paraffin and salt deposits.

AKM

The product is completed with elastic brush disks, which provide equalization of potentials of the downhole pumping equipment with the casing string. An additional purpose of the brush assembly is to dampen the radial oscillations of downhole pumping equipment in the well with the filtering effect of mechanical impurities entering the pump flow path. The body of the product ensures safe installation, operation and prevents the ingress of mechanical impurities from downhole pumping equipment and tubing to the bottom of the well

Operating principle of AKM

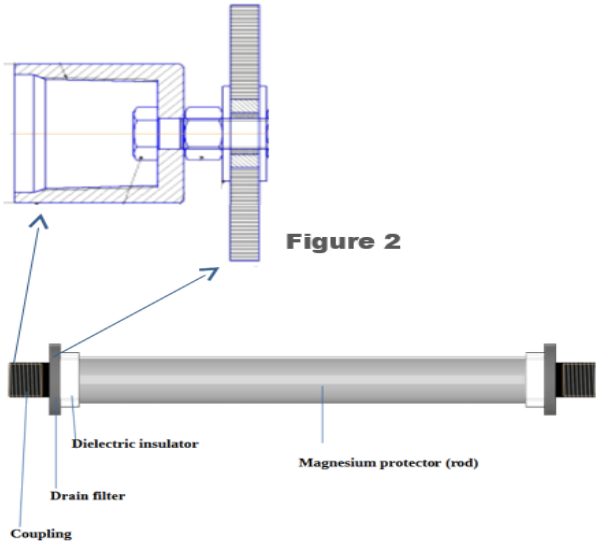


Figure 2

Confirmation that the AKM tool will operate due to eddy currents generated by the ESP (electric submersible pump)

Figure 2. Filter - drainer

The **AKM** contains a drain filter. The drain filter (Figure 2) is designed to equalize the potential between the pump assembly (ESP) and the casing (cased hole). The drain filter is also designed to dampen radial vibrations and reduce vibration loads on a submersible electric motor.
Elastic brush disks made of corrosion-resistant steel, the diameter of which exceeds the internal diameter of the casing, are used as a filter element.

Drain unit (Filter-drainer), consisting of a package of wire brush disks, the material of which is corrosion-resistant, high-alloy twisted steel, the outer diameter of the disks corresponds to the inner diameter of the casing, providing guaranteed galvanic and metallic contacts with the casing. Using a threaded coupling, the stacker-centralizer includes packages of spring disks made of corrosion-resistant, high-alloy steel, guides and fixing bushings, round section springs, a rod, a semiconductor diode, a rod insulator and nuts for force-locking the stacker structure.

Operating principle of AKM

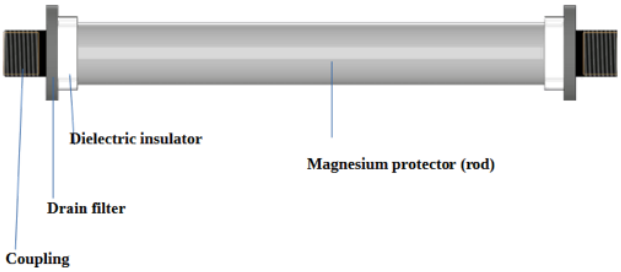


Figure 3

Confirmation that the AKM tool will operate due to eddy currents generated by the ESP (electric submersible pump)

Figure 3. General view of ACM

The **ACM** design makes it possible to obtain a potential difference on the electrode relative to the tubing string (tubes) due to cross-flows in the three-phase windings of the electric motor during pump operation and to provide cathodic protection of metal equipment from corrosion and prevent the accumulation of solid deposits on the protected equipment. ACM contains a magnesium protector equipped with upper and lower dielectric centralizers and a fastening pin. If there is an alternating stray current on the protected downhole equipment, there can be two cases:

1) when an element of downhole equipment is polarized by the anodic component of the stray current and the potential of the downhole equipment is more positive than the potential of the magnesium protector, the downhole equipment is cathodically polarized to a potential equal to the potential of the magnesium protector taking into account the voltage drop.

2) when an element of downhole equipment is polarized by the cathode component of the stray current and the potential of the downhole equipment is negative than the potential of the magnesium protector. Due to the resulting potential difference between the downhole equipment and the magnesium protector, the downhole equipment is anodicly subpolarized to a potential equal to the potential of the magnesium protector.

Operating principle of AKM

Configuration showing the location of the tool (AKM) in the completion string (in the production string)

An ESP is a downhole pumping unit capable of operating in environments characterized by its aggressiveness: oil and water, oil and hydrogen sulfide, as well as high temperature. In English - ESP (electric submersible pump) It consists of a submersible pumping unit (electric motor with hydraulic protection + pump), cable line, tubing string, wellhead equipment and surface equipment (transformer and control station).

Main components in the completion string (in the production string):

ESP (electric submersible pump) is a mainelement of the installation, which actually lifts the liquid from the well to the surface. It consists of sections, which in turn consist of stages (guide vanes) and a large number of impellers assembled on a shaft and enclosed in a steel casing (pipe). The main characteristics of an ESP are flow rate and pump lift, therefore these parameters are present in the Russian names of each pump. Example: ESP-60-1200 pumps 60 m3/day of liquid with a head of 1200 meters.

SEM (submersible electric motor) is the second most important element. It is an asynchronous electric motor filled with special oil.

Protector (or hydraulic protection) is an element located between the electric motor and the pump. It separates an electric motor filled with oil from a pump filled with formation fluid and at the same time transmits rotation from the motor to the pump.

A cable that supplies electricity to a submersible motor. Armored cable. On the surface and to the depth of the pump descent it is of a round cross-section , and in the area of the submersible unit along the pump and hydraulic protection it is flat.

Optional equipment:

Gas separator - used to reduce the amount of gas at the pump inlet. If there is no need to reduce the amount of gas, then a simple input module is used, through which the well fluid enters the pump.

A check valve (ball check valve) is used to fill tubing pipes with liquid before starting the pump. It also prevents liquid from draining down when the pump stops. When the pump is running, the check valve is in the open position due to pressure from below.

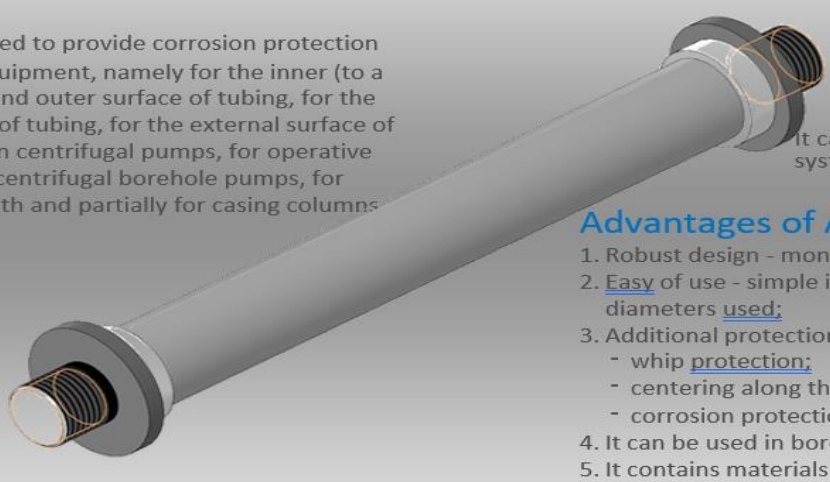
A drain valve is mounted above the check valve, which is used to drain fluid from the tubing before lifting the pump from the well.

AKM – anti-corrosion module. It consists of one or several sections (modules) connected to each other by transfer couplings. The number of sections is determined based on the daily flow rate of the well (m3/day) and the amount of hydrogen sulfide (%H2S) which contains oil.

This entire installation is assembled directly when it is lowered into the well. It is assembled sequentially from the bottom up, not forgetting about the cable, which is fastened to the installation itself and to the tubing on which it all hangs, with special metal belts. On the surface, the cable is fed to a step-up transformerand a control station installed near the bush. In addition to the listed components, foot valveand drain valve are installed in the tubing string above the electric centrifugal pump.

Anticorrosion module (AKM) refers to the galvanic corrosion protection method

AKM is designed to provide corrosion protection for downhole equipment, namely for the inner (to a greater extent) and outer surface of tubing, for the external surface of tubing, for the external surface of electrically driven centrifugal pumps, for operative parts of electric centrifugal borehole pumps, for cable metal sheath and partially for casing columns



AKM extends the useful life of tubing and electrically driven centrifugal pumps by 30%.

It can be equipped with ACM wear control system with signal transmission to the wellhead.

Advantages of AKM

1. Robust design - mono case;
2. Easy of use - simple installation, available adapters for any diameters used;
3. Additional protection for electrically driven centrifugal pumps:
   - whip protection;
   - centering along the borehole axis;
   - corrosion protection.
4. It can be used in boreholes with large angles;
5. It contains materials that are safe for human health;

Advantages over various methods of corrosion protection:

As a result of laboratory, bench and field tests of electrochemical protection using **AKM Anticorrosion module**, its high efficiency has been confirmed.

General distinctive properties:
comprehensive protection of pumping equipment;
- autonomous operation;
- easy installation;
- casing column and tubing protection;
- environmental and industrial safety.

SUMMARY

1. Over various coatings – development of under-film corrosion is excluded in case of mechanical damage to the coating during transportation and installation or poor application of coating.

2. Over various types of inhibitor protection - the absence of chemical agents and dosing units, an increase in the protected zone.

3. Over corrosion-resistant materials – a less expensive corrosion protection method.

Anticorrosion module
for Tubing and Electric Submersible Pumps from corrosion

RTH Prediction Technology

Technology Purpose:

To predict critical indicators for hydrocarbon field exploration and development by integrating next- generation depth seismic attributes, drilling data, and artificial intelligence (AI). This enables precise forecasting of reservoir characteristics, optimization of drilling strategies, and enhanced decision-making in resource extraction.

Core Components:

- **Reverse Time Holography (RTH)** (2017) : an innovative method for processing seismic exploration data.
- **Reverse Time Holography Artificial Intelligence (RTHAI)** (2023) : . a predictive AI-driven framework that

analyzes RTH-derived seismic attributes and drilling data

Key Innovations

- **Unmatched Resolution:** RTH's vector-based wavefield modeling provides 10x higher spatial detail compared to traditional scalar migration methods
- **AI Integration:** RTHAI uses voxel-level seismic attributes (e.g., 2x2x2 m grids) to train models, enabling predictions across entire geological volumes
- **Efficiency:** Reduces 3D seismic processing time from weeks to hours while improving accuracy

RTH Prediction Technology

Impact & Applications

- **Exploration**: Identifies "sweet spots" in unconventional reservoirs
- **Production**: Optimizes well placement and reduces drilling risks
- **Sustainability**: Lowers water cut by 10–15% and boosts oil recovery rates by 10–15%

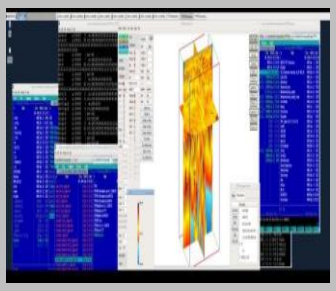
Technical Platform - ”RTH Prediction Engine”

- A single software and hardware platform powered by graphics accelerators
- Performance is 1.2 Petaflops , data storage capacity is 1 Terabyte , power consumption is 9 kW , and weight is 100 kg
- Linux-based architecture, integrates AI algorithms for automated data analysis and predictive mode

  enabling real-time processing of large 3D seismic datasets

Validation:

- **Testing:** Successfully deployed across 25 hydrocarbon and mineral fields, with RTHAI predictions validated at 7 sites
- **Recognition:** 31 peer-reviewed publications and presentations at major conferences (EAGE, SEG, SPE) underscore credibility



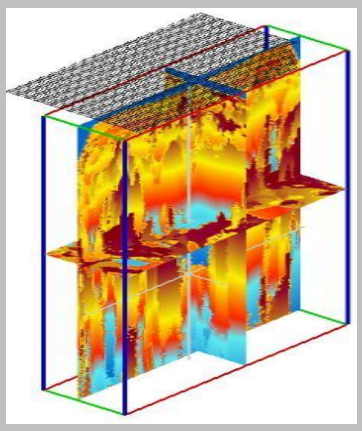
RTH Prediction Scheme

RT

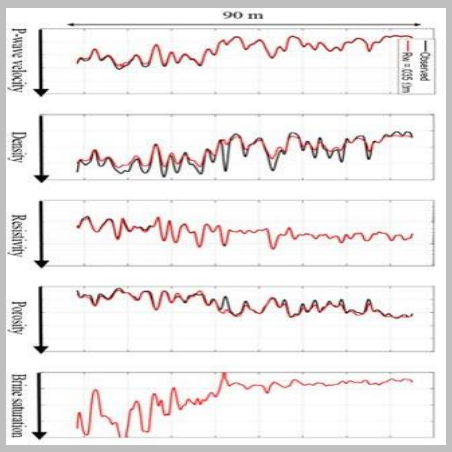
RT

CDP

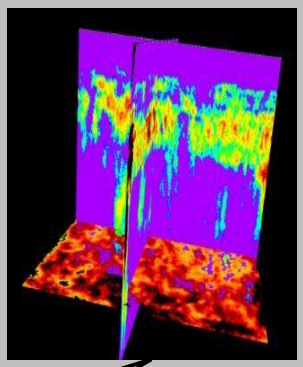
RTH



Well-log



Predictio



Prediction of fluid zones and

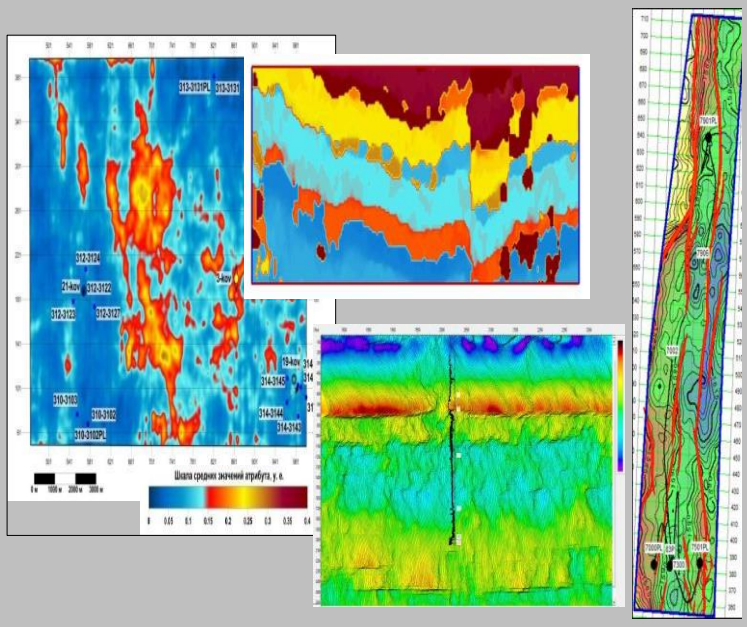
Flow prediction

Prediction of possible accidents during

RTH Prediction Roadmap

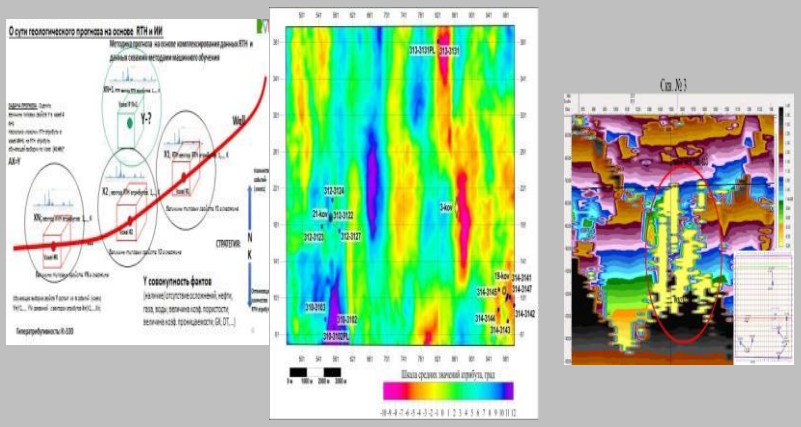
Step 1. RTH-driven processing and interpretation

Result: RTH cubes, stratigraphic boundaries, fracture zones, fault zones, angular anisotropy, frequency



Step 2. RTHAI-driven selecting a prediction object, preparation geological data and RTH attributes, training

Result: generation of sufficient data sets for training using AI algorithms



Step 3. RTHAI driven Prediction

Result: predicted cubes of porosity, gas, oil, permeability, fluid show, flow rates, possible drilling hazards